**Conjugated Polymer-Based Assembly Materials for Biomedical Applications**

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In recent years, conjugated polymers (CPs) integrating recognition, imaging and therapeutic functions have attracted more and more attention. A novel photodynamic therapy (PDT) system was developed in which the photosensitizer is activated by chemical molecules instead of an outer light source. In this system, luminal, hydrogen peroxide and horseradish peroxidase (HRP) were used as bioluminescent molecules and a cationic oligo (p-phenylene vinylene) (OPV) was used as the photosensitizer. The excited OPV by BRET from luminol sensitizes oxygen molecules in the surrounding area to produce ROS that kill adjacent cancer cells and pathogenic microbes. The BRET system can work in vivo even in the deeper tissue, which overcomes the drawback of the deep tissue penetration for PDT with light irradiation. We designed an oligo(p-phenylenevinylene) unit with thiol groups and a paclitaxelunit (OPV-S-PTX). The OPV-S-PTX is capable of diffusing into cells, where π-π interactions lead to aggregation. Crosslinking of the aggregates via oxidation of thiol groups preferentially occurs inside tumor cells because of their higher internal reactive oxygen species (ROS) concentration. Crosslinked aggregates effectively “chemically lock” the multichromophore particle inside the cells and this process decreases the diffusion of the molecules out of the cell. The formation of the chemically locked particles enhances drug efficacy and helps in reducing resistance. Recently, we have also described a supramolecular antibiotic switch to reversibly “turn-on” and “turn-off” its antibacterial activity, which provides a proof-of-concept to regulate antibacterial activity and avoid accumulation of active antibiotics in the environment. The antibiotic switch relies on supramolecular assembly and dis-assembly of cationic poly(phenylene vinylene) derivative (PPV) with cucurbit[7]uril (CB[7]), which regulates their different interaction manners toward bacteria. This supramolecular antibiotic switch could be a potential strategy to fight bacterial infections and drug-resistance.

**References**

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**Biography**

Shu Wang is currently a professor of Key Laboratory of Organic Solids, Institute of Chemistry, Chinese Academy of Sciences. He earned his B.S. in Chemistry from Hebei University in 1994 and his Ph.D. from Peking University in 1999. He was a postdoctoral researcher at Institute of Chemistry, Chinese Academy of Sciences from 1999 to 2001 and then at Institute of Polymers and Organic Solids, University of California at Santa Barbara from 2001 to 2004. His current research interest is focused on design, synthesis of optical functional organic conjugated molecules for biosensors, cell imaging and disease therapeutics. He has authored or co-authored more than 200 peer-reviewed articles, and is named in 30 patents or disclosures. Now he is Executive Editor of ACS Applied Materials & Interfaces.

